

PEER REVIEW HISTORY

BMJ Open publishes all reviews undertaken for accepted manuscripts. Reviewers are asked to complete a checklist review form (<http://bmjopen.bmj.com/site/about/resources/checklist.pdf>) and are provided with free text boxes to elaborate on their assessment. These free text comments are reproduced below.

ARTICLE DETAILS

TITLE (PROVISIONAL)	DEVELOPMENT OF A SYSTEM BASED ON ARTIFICIAL INTELLIGENCE TO IDENTIFY VISUAL PROBLEMS IN CHILDREN: STUDY PROTOCOL OF THE TRACKAI PROJECT
AUTHORS	Pueyo, Victoria; Pérez-Roche, Teresa; Prieto, Esther; Castillo, Olimpia; Gonzalez, Inmaculada; Alejandro, Adrian; Pan, Xian; Fanlo-Zarazaga, Alvaro; Pinilla, Juan; Echevarría, Jose Ignacio; Gutierrez, Diego; Altemir, Irene; Romero, María; Cipres, Marta; Ortín, Marta; Masiá, Belén

VERSION 1 - REVIEW

REVIEWER	Dr. Ramachandran Rajalakshmi Madras Diabetes Research Foundation, Chennai, India
REVIEW RETURNED	11-Oct-2019

GENERAL COMMENTS	<p>The manuscript describes the study protocol of developing a system to identify children with visual disorders with two components: a novel visual test implemented in a digital device, DIVE (Device for an Integral Visual Examination); and artificial intelligence algorithms that will run on a smartphone to analyse automatically the visual data gathered by device.</p> <ol style="list-style-type: none">1. Kindly explain regarding how the sample size of 2000 has been calculated for the study.2. The details of how many children with normal visual function and how many with abnormal visual function would be used in the AI training phase can be added.3. Who would be carrying out the DIVE examination. Would the tests be done by Optometrists. More clear methodology details can be added.4. Has a pilot test been done using DIVE. If so, please provide details.5. There are no details regarding the technical aspects of how the AI algorithm will be developed and what outputs would be provided by the algorithm6. If the study has funding details, kindly provide them.
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REVIEWER	Hidenori Takahashi Jichi Medical University Japan
REVIEW RETURNED	12-Oct-2019

GENERAL COMMENTS	<p>Authors are planning to develop AI algorithm for estimating children's visual prognosis.</p> <p>Variables: Usually AI means some deep architecture of machine learning. There is no bigdata, such as images, sounds, videos, etc. Isn't it enough to use multivariate analysis? Why do the authors use AI? What types of AI will the authors use? What is the definition of the AI used in this manuscript?</p> <p>Sample size: Visual acuity is influenced by fellow eye. Isn't it necessary to include fellow eye visual acuity? I think 4000 records will not be available without the fellow eye visual acuity.</p>
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VERSION 1 – AUTHOR RESPONSE

Reviewer: 1

Reviewer Name: Dr. Ramachandran Rajalakshmi

1. Kindly explain regarding how the sample size of 2000 has been calculated for the study.

The initial estimation of the 2000 participants required was based on previous studies. However, sample size will be adjusted along the recruitment based on the learning curves of the model. We have included more detailed information in the manuscript.

2. The details of how many children with normal visual function and how many with abnormal visual function would be used in the AI training phase can be added.

We have added this information to the Sample size section.

3. Who would be carrying out the DIVE examination. Would the tests be done by Optometrists. More clear methodology details can be added.

This information has been included in the Study design section.

4. Has a pilot test been done using DIVE. If so, please provide details.

The test used in this study is based on larger versions of different visual tests, already normalised and validated. References of these studies cannot be provided since they are currently under review. Different consecutive pilot studies have been carried out to get the final version of the test, as added in the Study design.

5. There are no details regarding the technical aspects of how the AI algorithm will be developed and what outputs would be provided by the algorithm

This information has been included in the Study design section.

6. If the study has funding details, kindly provide them.

This work has been funded by Huawei Technologies Company.

There are no further funding details.

Reviewer: 2

Reviewer Name: Hidenori Takahashi

7. Variables: Usually AI means some deep architecture of machine learning. There is no bigdata, such as images, sounds, videos, etc. Isn't it enough to use multivariate analysis? Why do the authors use AI? What types of AI will the authors use? What is the definition of the AI used in this manuscript?

Big data does not necessarily involve images, sounds, and videos. We do have very large data sets of gaze data (i.e. gaze positions every 6.7msec all over the visual test), which can be thought of as a stream of information similar to a video, which we aim to analyse to find patterns and associate them to normal or abnormal visual development and to certain specific pathologies. Analysing these gaze data is an extremely complex problem because of the variability among patients, even among those with the same age and visual development. A simple multivariate analysis would be unable to take advantage of all the information included on the gaze data logs, and to generalize among patients with different characteristics.

More details about the AI algorithms used have been included in the manuscript.

8. Sample size: Visual acuity is influenced by fellow eye. Isn't it necessary to include fellow eye visual acuity? I think 4000 records will not be available without the fellow eye visual acuity.

All the assessments will be performed binocularly and monocularly, with the fellow eye covered. Since both eyes can have a different visual development with different pathologies, both eyes will be considered independently for the monocular assessment.

Sample size section has been improved, and more information about its estimation is included in the manuscript.

VERSION 2 – REVIEW

REVIEWER	Dr. Ramachandran Rajalakshmi Department of Ophthalmology, Dr. Mohan's Diabetes Specialities Centre and Madras Diabetes Research Foundation, Chennai, India
REVIEW RETURNED	06-Dec-2019

GENERAL COMMENTS	The authors have carried out the suggested revisions. Please check page 3, line 58 in abstract and change as 'with a' instead of a with. Kindly check the manuscript for grammatical errors.
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REVIEWER	Hidehori Takahashi Jichi Medical University, Japan
REVIEW RETURNED	19-Nov-2019

GENERAL COMMENTS	In this revised version, the manuscript has been well improved according to the reviewers' comments.
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